

Inhale, Exhale, Excel: The Digital Odyssey of Pediatric Asthma Care

Karen Pugh, DNP, RNC, CNS

BACKGROUND

- Asthma, a persistent condition, necessitates continual medical attention due to its impact on the air passages (Pate et al., 2021).
- Over 25 million individuals in the U.S. are living with asthma (Pate et al., 2021).
- On average, 11 people die each day due to asthma-related complications (WHO, 2019).
- Managing asthma in children is challenging due to factors such as adherence and communication (Merchant et al., 2016).
- Emerging technologies offer innovative solutions to enhance asthma management in pediatric patients (Propeller, 2022).

PURPOSE

The *Propeller Inhaler* is a digital sensor-based device developed to improve asthma management in pediatric patients (Propeller, 2022).

Functionality:	Real-Time Tracking:	Personalized Treatment:	Adherence and Education:
Attaches to standard inhalers, recording usage data and transmitting it to a smartphone app.	Enables tracking of medication use and symptom patterns, aiding in identifying asthma triggers.	Helps healthcare providers tailor treatment plans based on recorded data.	Offers reminders and educational content to improve medication adherence and asthma knowledge.

This project aimed to answer the question:

Among pediatric caregiver asthma dyads, how will the use of a Propeller inhaler for short-term inhaled rescue medication impact patients' asthma control test (ACT) scores over eight weeks?

METHODS

Inclusion Criteria:

- 8 to 18 years old
- Asthma diagnosis by a physician
- Treated in the CHOC clinic in the last 12 months
- Inhaled corticosteroids > 6 months
- Inhaler model compatible with sensor device
- Access to smartphone and internet (and email)
- Poor ACT (≥ 2 ACT scores ≤ 19 , ≥ 2 oral corticosteroid prescriptions, ≥ 1 E.D. visit, and/ or ≥ 1 hospitalization in the previous 12 months)
- English or Spanish literacy
- Recommended by the provider

- Convenience sampling of eligible patients was identified by the care team
- Enrolled subjects received two digital sensors (controller/rescue).
- Descriptive data and baseline ACT scores collected through the electronic medical record.
- Post-ACT scores were retrieved from Propeller platform or via telehealth.
- G*Power analysis yielded a sample size of 40 patients
- Paired T-Test was used to analyze the data

RESULTS

- 40 caregiver/child dyads were enrolled; 15 completed the intervention.
- Mean age was 12.8 (SD 3.14, with a range of 8-15 years old).

Descriptive Data for Gender, Race, Preferred Language, and Asthma Type

Variable	n	%
Gender		
Male	10	66.7
Female	4	26.7
Unknown	1	6.6
Ethnicity		
Asian	1	7.0
Hispanic	12	80.0
Caucasian	2	13.0
Preferred Language		
English	8	53.3
Spanish	7	46.7
Asthma Type		
Mild Persistent	4	26.7
Moderate Persistent	9	60.0
Severe Persistent	2	13.3

Note: n = count; % = percentage.

- There was a statistically significant increase in the mean ACT scores from baseline over 8 weeks.

Paired t-Test Results for ACT Scores

Variable	Baseline		Post		t (14)	p
	M	SD	M	SD		
ACT	16.07	4.09	20.13	2.50	-4.77	.001

Note. M = mean; SD = standard deviation.

- Clinical significance was supported by the 4.07 mean increase in the ACT mean scores post-intervention of the sensor with reminders.

CONCLUSIONS

- A positive correlation exists between higher ACT scores and improved asthma control (Gupta et al., 2021).
- ACT ≥ 20 indicates adequate management of asthma (Merchant et al., 2016).

The use of the Propeller sensor-based inhaler was associated with increased ACT scores.



- Results are consistent with research findings from Barrett et al. (2021) and Gupta et al. (2021), reinforcing the potential benefits of digital tools in managing asthma, especially in pediatric patients.

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